UNITED STATES BANKRUPTCY COURT
SOUTHERN DISTRICT OF NEW YORK

In re	:	Chapter 11
DELPHI CORPORATION, et al.,	:	Case No. 05-44481 (RDD)
	:	(Jointly Administered)
Debtors.	:	

APPENDIXES A - J

TO

RESPONSE OF ROBERT BOSCH GmbH TO DEBTORS' THIRD OMNIBUS OBJECTION TO CLAIMS

APPENDIX A

Appendix A

GM WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW – 3320 Epsilon

General Motors
Baseline Component Technical Specification

SDM/ESS - 40.7.03

Version 3.5
April 18, 2000

Release 3.5

draft

Appendix A, page 10

Table 3.1.4.2.5-I Resistance of Deployment Loops

PARAMETER	MIN.	MAX.	UNITS
Initiator Resistance	1.7	2.3	Ω
0.5 Ohm Clock spring Coil Resistance(both legs)(T_C = .00385 ohms/ohm/°C @ 25°C)			m = milli
T_a = 25°C	300	600	mΩ
T_a = -40°C to 85°C	236.5	738.6	mΩ
Wire resistance for any deployment loop 1.83 to 9.14 m (6-30') of SAE[1] 0.35 mm^2 wire @51.5 mohms/m (bare wire w/o tin coating) with T_C=.00385 ohms/ohm/°C @25°C	1.83	9.14	meters
T_a = 25°C	94.3	470.8	mΩ
T_a = -40°C to 85°C	74.3	579.6	mΩ
Connector Interfaces:			
(Driver stage 1 and 2 airbag has 6 connections @ .02 Ω each)	0.0	120.0	mΩ
(Passenger stage 1 and 2 airbag has up to 6 connections @ .02 Ω each)	0.0	120.0	mΩ
(Front and Rear Side and Overhead Impact Airbag has up to 8 connections @ .02 Ω each)	0.0	160.0	mΩ
(Each pretensioner has up to 8 connections .02 Ohm each)	0.0	160.0	m Ω
Increase in initiator resistance during deployment	0.0	0.5	Ω
Total Diagnostic Resistance (not including initiator resistance increase)			
Driver Loop (@25°C /@Temp. Limits)	2.09/2.01	3.49/3.74	Ω
Pretensioner (@25 C/@ Temp. Limits)	1.79/1.77	2.93/3.04	
Total deploy loop resistance (including initiator resistance increase)			
Driver Loop (@25°C /@Temp. Limits)	2.09/2.01	3.99/4.24	Ω
Pretensioner (@25 C /@ Temp. Limits)	1.79/1.77	3.43/3.54	

Release 3.5 draft

3.1.4.2.5.2 Deployment Loop Assignments

a. Loops 1-4 shall be dedicated to frontal airbags.

b. To minimize permutations, odd numbered loops shall be restricted to the driver side and even numbered loops to the passenger side.

c. Other loop assignments shall be directed by the platform.

d. Energy reserve shall be assigned to loops 1-4.

e. Assignments shall be configurable at the vehicle assembly plant through a CLASS 2/GMLAN message or at the supplier's facility which will be jointly determined by GM and the supplier.

[1] Note: A similar calculation is required for SAE 0.5 mm^2 wire gage.

Appendix A, page 17

GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW – 3320 Epsilon

The SDM shall provide redundant power for deployment using vehicle electrical power and the reserve (where mechanized).

3.2.1.4.1 Deployment Energy Reserve
The requirements for the SDM energy reserve are:

a. The SDM shall provide an energy reserve for the first 4 deployment loops to allow deployment 150 ms after power to the battery input is lost. This shall apply to each frontal airbag, including both levels if dual level frontal airbags are implemented.

b. The specified energy reserve times shall be provided for voltages between 9.0 and 16.0 volts inclusive using the worst-case deployment loop resistance.

c. A shorted ignition input shall not deplete the energy reserves prior to commanded deployment.

d. A shorted squib or short to ground in one or more deployment loops (e.g., shorted squib caused by a plasma forming in the igniter) shall not result in the inability to deploy other deployment loops or cause the energy reserve times in the other loops to be less than 150 ms.

e. If the SDM has detected a frontal crash event is in progress as specified in 3.2.2 Physical Characteristics, the SDM shall not reset any SDM function when electrical power disruptions of any length up to 150 ms occur.

f. Energy reserve capacitors for the second pair of loops shall be individually 'parts deletable' at platform direction.

Release Draft

3.2.1.4.2 EFS Energy Reserve

a. The supplier shall 'package protect' an area of the printed circuit board so that a 'parts deletable' common energy reserve can be included as specified by individual platforms.

b. When an energy reserve is provided for the EFS (see 3.2.1.4.2) and battery voltage drops below 9 volts, each of the two EFSs shall operate without interruption for a minimum of 60 msec.

c. The reserve time shall be a minimum of 60 ms under the assumption that neither EFS is shorted during impact. Under shorted conditions (for either or both EFS), the EFS reserve shall be a minimum of 50 msec.

d. The specified energy reserve times shall be provided when battery voltage is between 9.0 and 16.0 volts.

e. A short to ground on both EFS devices shall not degrade the 150 ms energy reserve time USED FOR SINGLE POINT SENSING.

f. A shorted battery input to the SDM shall not deplete the energy reserve prior to commanded deployment.

3.2.1.4.3 Other Energy Reserves
See appropriate appendix.

3.2.1.5 Perform Under Specific Environments
Several specific environmental conditions for which an associated SDM/ESS performance is required are defined in the following paragraphs.

APPENDIX B

Automotive Engineering International Online: Delphi occupant detection for advanced airbags - Microsoft Internet Explorer provi

Datei Bearbeiten Ansicht Favoriten Extras ?

Adresse http://www.sae.org/automag/convergence/delphi.htm

AEI in Print
Subscribe
Current Issue
Contact Us
Magazines Home
SAE Home

automotive engineering international Online

Contents

- Tech Briefs
- Focus on Electronics
- Global Vehicles
- Material Innovations

Past Content

Search: Go!

/product info

Delphi occupant detection for advanced airbags

Delphi Automotive Systems announced that it is supplying a smart occupant-detection system for Jaguar and four Ford and Lincoln-Mercury models. The Passive Occupant Detection System (PODS) is the first weight-sensing system to reach the market, according to Delphi, and is standard equipment on the 2001 Jaguar XK sports car's Adaptive Restraint Technology System (ARTS).

PODS enables the "smart" deployment or suppression of passenger airbags. The weight-based system will help automakers meet the recently announced U.S. Federal Motor Vehicle Safety Standard (FMVSS) 208, which requires airbags that are more effective for a broader range of occupant weights. Beginning in 2004, 35% of each manufacturer's fleet sold in the U.S. must be equipped with advanced airbag systems, with the number increasing to nearly 100% by 2006.

PODS technology consists of a bladder-based weight-sensing technology mounted under the passenger seat cushion. Sophisticated occupant classification algorithms and extensive signal processing allow the vehicle airbag controller to variably deploy or suppress the passenger airbag, the latter significantly reducing repair costs. The technology consists of a silicone-fluid-filled bladder system produced by American Components Inc. (ACI), a pressure sensor under the seat cushion, and an electronic control unit for sensor data processing. Delphi and ACI applied bladder technology used for lumbar supports to the special PODS bladders.

Delphi is working with seat manufacturers, as well as other systems suppliers and vehicle manufacturers, to integrate PODS into vehicles. For example, Delphi is integrating PODS with another supplier's ultrasonic sensing system to provide additional passenger positioning measurements. While the ultrasonic sensors constantly monitor the presence and position of the front passenger, the PODS

Fertig Internet

Automotive Engineering International Online: Delphi occupant detection for advanced airbags - Microsoft Internet Explorer provi

Datei Bearbeiten Ansicht Favoriten Extras ?

Adresse http://www.sae.org/automag/convergence/delphi.htm

Delphi occupant detection for advanced airbags

Delphi Automotive Systems announced that it is supplying a smart occupant-detection system for Jaguar and four Ford and Lincoln-Mercury models. The Passive Occupant Detection System (PODS) is the first weight-sensing system to reach the market, according to Delphi, and is standard equipment on the 2001 Jaguar XK sports car's Adaptive Restraint Technology System (ARTS).

PODS enables the "smart" deployment or suppression of passenger airbags. The weight-based system will help automakers meet the recently announced U.S. Federal Motor Vehicle Safety Standard (FMVSS) 208, which requires airbags that are more effective for a broader range of occupant weights. Beginning in 2004, 35% of each manufacturer's fleet sold in the U.S. must be equipped with advanced airbag systems, with the number increasing to nearly 100% by 2006.

PODS technology consists of a bladder-based weight-sensing technology mounted under the passenger seat cushion. Sophisticated occupant classification algorithms and extensive signal processing allow the vehicle airbag controller to variably deploy or suppress the passenger airbag, the latter significantly reducing repair costs. The technology consists of a silicone-fluid-filled bladder system produced by American Components Inc. (ACI), a pressure sensor under the seat cushion, and an electronic control unit for sensor data processing. Delphi and ACI applied bladder technology used for lumbar supports to the special PODS bladders.

Delphi is working with seat manufacturers, as well as other systems suppliers and vehicle manufacturers, to integrate PODS into vehicles. For example, Delphi is integrating PODS with another supplier's ultrasonic sensing system to provide additional passenger positioning measurements. While the ultrasonic sensors constantly monitor the presence and position of the front passenger, the PODS system detects the approximate weight of the occupant. In other applications, PODS will be integrated with a seat-belt-tension sensor to provide an airbag suppression system to meet the new federal guidelines.

Occupant-sensing products are anticipated to generate $3.6 billion or more in new revenue opportunities for automotive suppliers by 2006, according to Strategy Analytics Ltd.'s recent Automotive System Demand report. The report forecasts that the systems will grow in sales at a 70% compound annual rate over the next six years.

Kevin Jost

Fertig Internet

APPENDIX C

Delphi To Supply GM With New Passive Occupant Detection System - General Motors Corp - Brief Ar - Microsoft Internet Explorer p

Datei Bearbeiten Ansicht Favoriten Extras ?

Adresse C:\03 Delphi\Dokumente Nachweise\Delphi To Supply GM With New Passive Occupant Detection System.htm

Delphi To Supply GM With New Passive Occupant Detection System - General Motors Corp - Brief Article

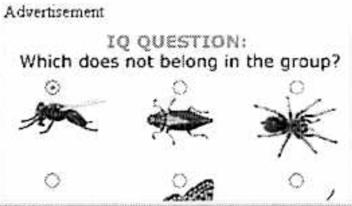
Autoparts Report, Oct 19, 2001

Delphi Automotive Systems said it has been awarded a contract with General Motors Corp. for its advanced passive occupant detection system (PODS), company officials said. Financial details were not released. The technology will be featured on various GM programs between 2001 and 2004, with specific program details to be announced at a later date, GM officials said.

The technology was first introduced last year as standard equipment on the 2001 Jaguar XK sports car series Adaptive Restraint Technology System (ARTS), the company said. It has since been slated for use on other Ford Motor Co. products.

Delphi's total revenue for PODS now has the potential to grow in excess of $300 million annually in 2004, the company said. Delphi's PODS is a seat-based sensor providing information to the airbag computer to determine whether to suppress or allow passenger variable airbag deployment based on the passenger's weight classification, it said.

Recently enacted legislation requires that vehicles marketed in the United States must begin implementation of an advanced airbag system, with 100 percent compliance required by model year 2006.



Fertig Internet

APPENDIX D

Focus on Electronics

November 2002
More 1 2

This special Focus on Electronics section features some of the significant supplier contributions to vehicles for MY2003 and beyond.

GM trucks get Delphi occupant sensing

Delphi's passive occupant detection system is fitted to the 2003 Cadillac Escalade ESV.

Front passengers of select 2003 **General Motors** full size pick-up trucks and sport utility vehicles have a reduced risk of airbag-induced injury via a system that decides whether to deploy or suppress the safety device. **Delphi Corp.**'s second-generation Recognition Passive Occupant Detection System features a fluid-filled, seat-based load sensor as well as a seatbelt tension sensor. (The first generation of the system did not incorporate the seatbelt tension-sensor aspect.) The 2003 **Chevrolet** Suburban, **GMC** Denali, and **Cadillac** Escalade, are among the first automobiles in compliance with FMVSS 208 regulations.

"The system measures the seated weight of the occupant and then turns that weight into a pressure reading," said Joe Garcia, General Motors Airbag Safety Development Engineer, adding, "The pressure reading is sent to the electronic control unit and along with the belt-tension sensor, it determines an overall pressure signal. Based on the overall pressure signal, it determines whether it's above or below an airbag-enabled threshold."

Delphi's passive occupant detection system is fitted to the 2003 Cadillac Escalade ESV.

Front passengers of select 2003 **General Motors** full size pick-up trucks and sport utility vehicles have a reduced risk of airbag-induced injury via a system that decides whether to deploy or suppress the safety device. **Delphi Corp.**'s second-generation Recognition Passive Occupant Detection System features a fluid-filled, seat-based load sensor as well as a seatbelt tension sensor. (The first generation of the system did not incorporate the seatbelt tension-sensor aspect.) The 2003 **Chevrolet** Suburban, **GMC** Denali, and **Cadillac** Escalade, are among the first automobiles in compliance with FMVSS 208 regulations.

"The system measures the seated weight of the occupant and then turns that weight into a pressure reading," said Joe Garcia, General Motors Airbag Safety Development Engineer, adding, "The pressure reading is sent to the electronic control unit and along with the belt-tension sensor, it determines an overall pressure signal. Based on the overall pressure signal, it determines whether it's above or below an airbag-enabled threshold."

To suppress the airbag, input from the weight-pressure sensor must indicate the weight is at or below the combined mass of a six-year-old child in a booster seat, or the safety-belt sensor must indicate that belt tension is above 15 lb (6.8 kg). An enabled airbag means the pressure sensor, mounted under the passenger seat cushion, must indicate a weight at or above that of a properly seated 108-lb (49-kg), 5th percentile female occupant, and the safety-belt tension sensor must indicate a value below 15 lb (6.8 kg).

Through the use of occupant classification algorithms and signal processing, the vehicle airbag controller is notified to deploy or suppress the passenger airbag. The seat-belt-tension sensor uses an algorithm compensation feature as a means of determining whether a child seat with a tightly cinched seat belt or a person is occupying the seat.

"The end result is a product that is robust, meets government and customer requirements, is easily adapted to nearly every vehicle seat type, and has achieved unprecedented market success," said Delphi engineer Craig Tieman, Chassis Safety Product Marketing Manager.

- *Kami Buchholz*

APPENDIX E

DELPHI

SAFETY & SECURITY SYSTEMS

Delphi Passive Occupant Detection System B

Description

The Delphi Passive Occupant Detection System (PODS-B) is designed to classify the occupant seated in the front passenger seat for potential airbag suppression. It consists of a pressure sensor, bladder assembly, belt tension sensor and an electronics control unit (ECU). The sensing system detects loading force on the front passenger seat and classifies the seat as empty or the occupant as an adult or infant/child. The ECU processes the sensor data and provides a deployment-allowed output to the vehicle's sensing and diagnostic module when a defined threshold is met.

Benefits

- Helps reduce the potential for airbag-induced injury
  - Allows airbag suppression when seat is empty
  - Allows airbag suppression when occupant is below defined threshold
  - Allows airbag suppression for children as defined by the advanced airbag regulation FMVSS 208
  - Allows airbag deployment when 5th percentile female and larger adults are present
- Does not require driver action to suppress passenger airbag
- Integrated into the seat assembly
- Uses low-cost, proven automotive technologies

Features

- Differentiation of cinched vs. uncinched seat occupants using dynamic pressure information and vertical acceleration
- Calibratable thresholds
- Accepts input from a belt tension sensor for FMVSS 208 compliance
- Interfaces with sensing and diagnostic modules equipped with an airbag suppression feature

Delphi Corporation
World Headquarters
5725 Delphi Drive
Troy, Michigan 48098-2815 USA

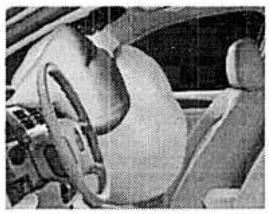
APPENDIX F

During: Protecting Occupants | Air Bags

AIR BAG QUESTIONS | new technology

question **Has GM installed "smart" air bags in its vehicles?**

answer Yes. In October 2002, GM was the first automaker to implement an advanced passenger frontal air bag sensing system that will automatically turn off the air bag under certain conditions.



Dual Depth Frontal Air Bag
Click here to download the animation

The technology behind this advanced air bag is GM's passenger sensing system, which is designed to prevent the passenger frontal air bag from deploying when a rear-facing infant seat, a forward-facing child restraint or a booster seat is detected. It also is

system that will automatically turn off the air bag under certain conditions.

The technology behind this advanced air bag is GM's passenger sensing system, which is designed to prevent the passenger frontal air bag from deploying when a rear-facing infant seat, a forward-facing child restraint or a booster seat is detected. It also is designed to turn off the air bag if no occupant is detected. An indicator light on the rear-view mirror provides continuous, real-time feedback about the system's status.

In the event of a crash of sufficient severity, the right frontal air bag is designed not to deploy if the system detects pressure at or below what a six-year-old child in a booster seat produces, even when belted with up to 30 pounds of tension.

The system uses sensors in the seat to gather information on the occupant's weight and the type of pressure placed on the seat. It also uses a sensor in the passenger-side seat belt to measure how much tension is exerted by the seat belt when it is being cinched down, another means of determining what may be on the seat.

Despite this new technology, GM continues to recommend that children 12 and under be transported in the rear seating positions, properly restrained. Crash statistics show that children are safer there. This is true in all vehicles, even those without air bags. Rear-facing restraints SHOULD NEVER be used in a front seat with an active passenger air bag. Learn more at www.ourpreciouscargo.com, www.safekids.org, and the Safety section of www.gmability.com.

GM Safety Firsts
RSS News Feed

APPENDIX G

Trend Watch

Occupant Detection Sensors

Automakers look to possible smart air bag mandate

-- Design News, June 6, 2005

Electronics suppliers are gearing up for the growing popularity of smart air bags, and they're going to need a variety of sensors to bring the technology to fruition. The new breed of air bags, developed in response to fatalities suffered by children and small adults struck by full-power bags, calls for electronic systems to recognize the weight (and possibly the position) of seated individuals.

"The front passenger seat is the obvious application today, particularly in pickup trucks and sports cars, where there's not an option to put a child in the back," notes Brad Stewart, principal applications in the Sensor and Analog Products Division at Freescale Semiconductor, an occupant detection sensor supplier.

Occupant Detection Sensors - 6/6/2005 - Design News - Microsoft Internet Explorer provided by Peacy

Datei Bearbeiten Ansicht Favoriten Extras ?

Zurück Suchen Favoriten Medien

Adresse http://www.designnews.com/article/CA603759.html Wechseln zu Links

Motion Control/Automation
Electronics/Test

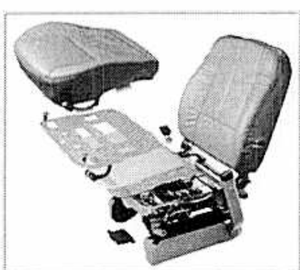
back," notes Brad Stewart, principal applications in the Sensor and Analog Products Division at Freescale Semiconductor, an occupant detection sensor supplier.

It is All About μ
Wake-Up Call for Inattentive Drivers

To date, there's no universal method for distinguishing between children and adults. Tier-one suppliers—including Delphi Corp., Bosch Automotive, Siemens VDO Automotive, and TRW Automotive—are attacking the problem with a variety of techniques.

Following are three solutions to the weight sensing problems, each using different technologies.

Delphi's weight and position detection

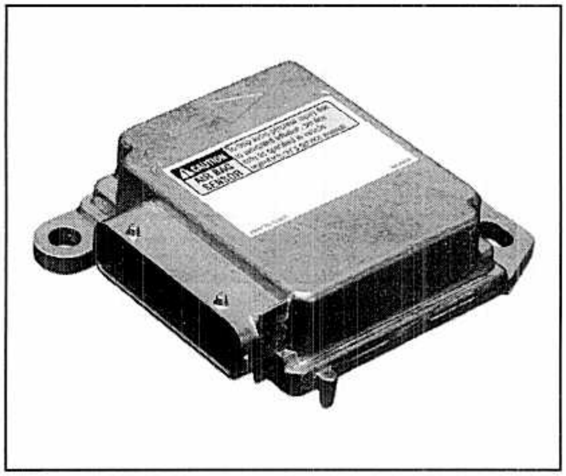


Delphi, a tier-one automotive supplier, makes two types of sensors for its own detection systems. The company's first-generation system, designed for weight detection, uses piezoelectric sensors and Hall Effect sensors in concert with fluid-filled bladders located in the car seat. Together, the sensors provide input to a software algorithm in a microcontroller beneath the seat. The second generation of Delphi's Occupant Position and Recognition System employs infrared (IR) sensors. By filling the passenger compartment with invisible measurement coordinates, the IR sensors enable the system to recognize if the occupant is out of position, or if a rear-facing child seat is present. For more information on Delphi's detection technology, go to http://rbi.ims.ca/4392-533.

APPENDIX H

Sensing and Diagnostic Module SDM-GF

Description – The SDM-GF Sensing and Diagnostic Module (SDM) is the safety restraint system central control module and is designed to provide sensing and discrimination of crash pulses and control of deployable restraints. The SDM is designed for installation within the vehicle passenger compartment and will sense crashes independently (frontal only) or in conjunction with frontal and side satellite crash sensors. The SDM is also designed to automatically allow or suppress passenger airbag deployment based upon inputs from either a manual airbag deactivation switch or an automatic occupant sensor. It contains crash data recording capability and provides a serial data link for vehicle systems communication.



Features

- Algo-S℠ severity-based algorithm with pretensioner, single or dual-stage airbag deployment capability
- Frontal crash discrimination
- Support of 2 frontal and 2 side satellite sensors
- Frontal and side impact logic-level safing
- 1-12 pyrotechnic loop capability (configurable)
- Supports automatic occupant sensor input for passenger airbag suppression to meet new FMVSS208 regulations
- Diagnostics of driver and passenger seatbelt-buckled and seat position switches
- Class 2 (SAE J-1850) vehicle bus to enhance vehicle communications capability
- Crash data recording functions to assist forensic engineering
- Energy reserves on specific airbag loops and frontal satellite sensors for crashes with battery disconnects
- Water-resistant package and connector system
- Unique mechanical connector is keyed for each vehicle calibration to help ensure proper vehicle application

Consumer Benefits

- Designed to protect front seat passengers in frontal crashes by deploying single or dual-stage frontal airbags and pretensioners
- Designed to protect front and rear seat passengers in side crashes by deploying thorax airbags
- Capable of disabling deployment of passenger airbags through the use of an automatic occupant sensor input

OEM Benefits

- Provides necessary functions to support a FMVSS208-compliant safety restraint system
- Provides many vehicle configuration and calibration options to enable tailoring system performance to unique vehicle requirements

DELPHI

www.delphi.com

Delco Electronics Systems
World Headquarters
P.O. Box 9005 Kokomo, IN 46904-9005
Tel: [1] 765.451.5011 Fax: [1] 765.451.5426

APPENDIX I

Crash Sensing Capability

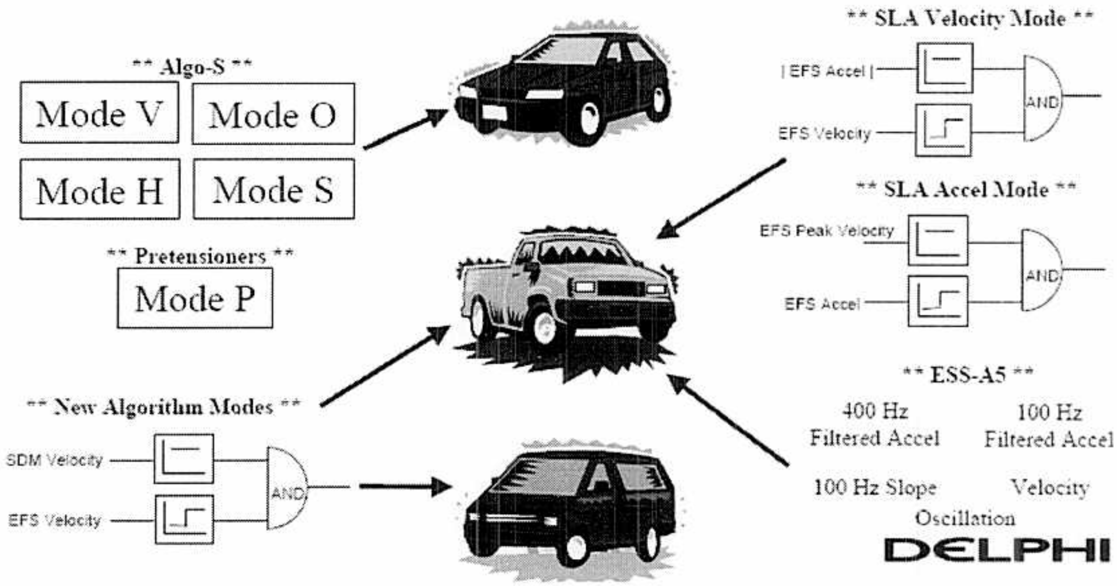
- Proven Experience
  - Secure crash library containing 5,000+ crash events and 20,000+ abuse/rough road events
  - Production central controllers since 1989 and electronic satellite sensors since 1997
  - Extensive experience on sensor location optimization on a wide range of platforms – from small cars to trucks
- Innovative Algorithms
  - Acceleration-based measures for either single-point or multi-point systems
  - Sophisticated deployment logic allows flexibility for single or multi-stage airbags
  - Separate arming/safing functions increase system fault tolerance for multi-sensor system
  - Acceleration / Pressure satellite sensors provide optimized sensing system
- Unique Sensing Solutions
  - Single or multi-point systems for both single and dual stage frontal airbags
  - Capable of both pillar and door sensor location for side airbags

GM DELPHI


A NHTSA crash test

Frontal Crash Sensing Next Generation Algorithm Algo-G

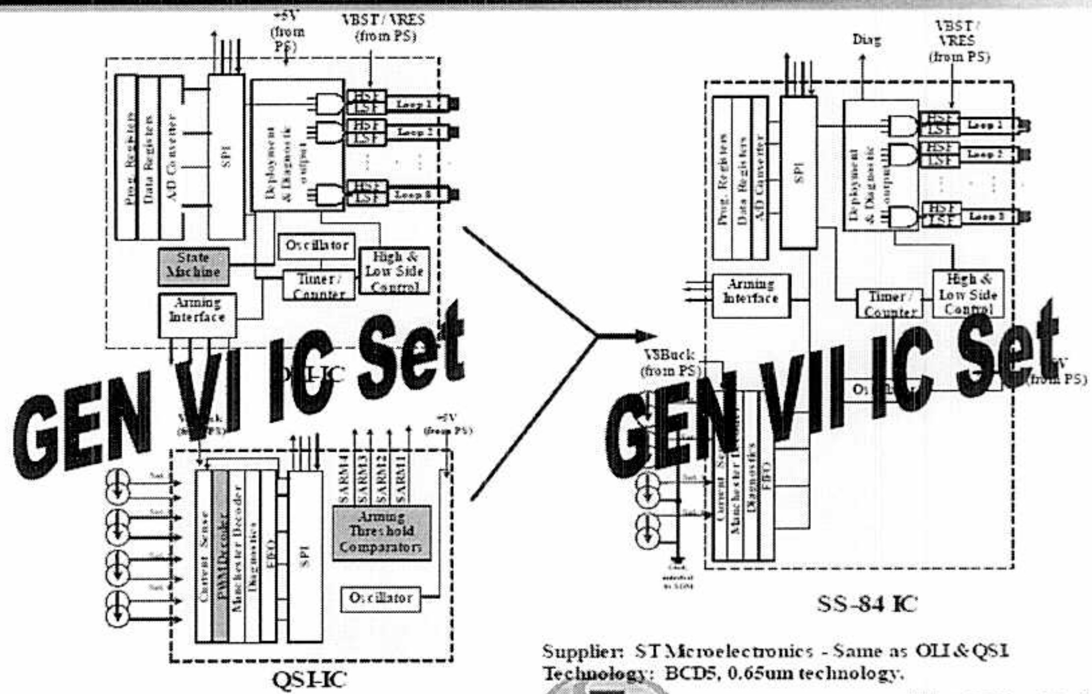
Each algorithm module shall be optimized and identified with Critical Computer Resources (CCR), then each vehicle application shall be given a CCR "budget" that must not be exceeded for the sum total of all algorithm modules chosen.



DELPHI

APPENDIX J

SS-84 Building Block Architecture



DELPHI

Squib & Satellite Interface IC SS-84, SS-42

- Deployment loop interface functions
  - 1.2 amp, 2.0 msec minimum deployment current levels
  - SPI deployment communications
  - Independent deployment enable (DEPEN) input
  - Independently controlled high-side and low-side FETs
  - Independent SPI arming input with pulse stretch
  - Analog output for resistance measurement diagnostics
  - Short to battery, short to ground and open loop detection
  - Deployment Driver Test
    - » Hardware controlled turn off of FET test
    - » Continuous short to battery and ground check with disable
    - » Continuous differential voltage check with disable
  - Loss of ground connection diagnostic

DELPHI